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POWDER RIVER

TRACT PROFILE
NORTHWEST OTTER CREEK TRACT, MONTANA

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

#54790893 ID: 88081509 HD 242.3 .P6966

SITE SPECIFIC ANALYSIS
1. NORTHWEST OTTER CREEK

INTRODUCTION

A. PURPOSE AND NEED

The purpose of this analysis is to comply with the Secretary of Interior's decision that a sufficient number of tracts be delineated and selected for sale from the areas designated in land use plans as acceptable for further consideratio for leasing to meet the regional leasing target. As a result of the 1979 Powder River Management Framework Plan (MFP) Update, this tract was identified for further consideration for coal development through competitive leasing.

It should be noted that the acreage and legal description of federal coal discussed in this Site Specific Analysis is limited to those areas that have been included in the comprehensive land-use plan, in accordance with Section 3(A)(i) of the Federal Coal Leasing Amendments Act of 1976, and the decision of the U.S. Secretary of Interior June 2, 1979, that the coal to be selected for sale come "from the areas designated in land-use plans as acceptable for further consideration," (page 60 of Volume I of the Secretarial Issue Document). The coal deposit tonnage listed from the Engineering Report of the U.S. Geological Survey includes areas outside of the BLM planning area.

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Company: BN
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I. ALTERNATIVES, INCLUDING THE PROPOSED ACTION

A. NO ACTION ALTERNATIVE

Under the no action alternative, federal coal would not be leased. Because of the "checkerboard" ownership patterns, development would not occur on this tract. Approximately 411 million tons of coal, recoverable by existing methods, would not be mined. It should be noted that mining of fee coal will take place in the nearby area with attendant growth and development to occur.

B. PROPOSED ACTION

The proposed action is to offer for competitive leasing a 5,464-acre tract of land in western Powder River County and eastern Rosebud County, containing 411 million tons of recoverable coal. The tract comprises an area identified by the U.S. Geological Survey as an economical mining unit for development of a 40-year strip mining operation. The tract is located 3 to 4 miles southeast of Ashland and 2 miles south of U.S. Highway 212. See Map 1 for location and legal description.

The mining operation would have an annual production of 10.3 million tons and would employ 409 persons during construction and 370 persons during production. The tract is composed of 138.6 million tons of federal coal, 210.2 million tons of fee (private) coal and 62.1 million tons of state coal. Surface disturbance would be approximately 137 acres a year. Total disturbed area would be 5,464 acres from mining and 225 acres from facilities and haul roads.

For more specific information on the proposed mining operation, refer to the Engineering Report prepared by the U.S. Geological Survey.

The proposed action assumes that proper mining and reclamation will be carried out according to existing state and federal regulations. These include: Office of Surface Mining Reclamation and Enforcement (OSM) regulations (30 CFR 700-899), Environmental Protection Agency (EPA) regulations (40 CFR 0-1399), Department of the Interior's coal management program regulations (43 CFR 23 and 3400 and 30 CFR 211), and regulations of the Montana Department of State Lands.

Tract Delineation Report Summary

Tract Name: Northwest Otter Creek State: Montana

The Northwest Otter Creek tract is located in the center of the northern Powder River Basin, Rosebud & Powder River Counties, Montana. The tract contains one recoverable coal bed, the Knobloch, which is present in one seam.

The coal deposit occurs in the top part of the Fort Union Formation (Paleocene), which comprises approximately 3,000 feet of sandstones, shales, siltstones, and coal seams. The formation occurs in nearly flat-lying beds. The coal is subbituminous in rank and weighs 1,770 tons per acre-foot. There are no known geologic hazards to surface mining in the NW Otter Creek tract. See the tract profile summary for the salient geologic data for the tract.

The generic mining plan calls for a surface mine using draglines, electric shovels, dump trucks, loaders, scrapers, and other support equipment. The coal would thus be mined to a depth of 200 feet or until the limiting stripping ratio (6:1) has been reached. The plan indicates that the coal would be shipped by railroad to an electrical utility out of the Powder River Region.

Tract Profile Summary

Northwest Otter Creek

Coal Data	Proposed Action
Total Reserves (Million Tons Strippable)	154
Recoverable Reserves (Million Tons)	Federal 139 (total 411)
Average Coal Thickness (Ft.)	62
Average Overburden (Ft.)	150
Coal Rank	subbituminous
Percent Recovery	90
Proximate Coal Analysis	
Percent Moisture	27.3
Percent Ash	6.2
Percent Sulfur	0.2
BTUs Per Pound	8,497
Mine Life (Years)	40
Annual Production Rate (Million Tons)	10.3
Tract Area (Acres)	5,464
Surface Mine/Truck Shovel Operation	
Employment	
Construction	465
Mine Operation	370
Environmental Data	
Water Requirements	127 acre-feet/year.
Transportation, Land Use, VRM, Vegetation	Moderate during mining; low after mining.
Soils	High to moderate.
Reclamation	Low, if successful.
Wildlife	Moderate loss of habitat.
Noise, Air Quality	High during mining, low after successful reclamation.
Agriculture	Moderate during mining; low after successful reclamation.

TRACT PROFILE INTRODUCTION

Background

In July 1979, the BLM, Miles City District Office completed the Powder River Resource Area update for portions of Powder River, Custer, Big Horn, Treasure and Rosebud counties. The land use planning process included applying unsuitability criteria, multiple-use conflict evaluation, and surface owner consultations. As a result of that work, areas were identified that could be further considered for coal development. The areas are available for consideration for new competitive leasing, leasing by exchanging and modifying existing leases.

Following land-use planning the BLM requested expression of interest which, along with other information, guided the GS in delineating this tract. Results of that work are summarized in this profile.

Personnel from BLM, Miles City District inventoried the tract to determine the site specific resource values and then analyzed potential environmental effects of coal development on this individual tract. Among other items, the unsuitability criteria (43 CFR 3461) were reconsidered on this site-specific basis. Any new findings of unsuitability are reflected in the delineation and development proposal of the tract described in this profile.

To be further considered for new competitive leasing, the tract will be presented to the Regional Coal Team who guides and reviews tract ranking and selection and sale scheduling procedures that develop alternatives which would be analyzed in a regional environmental impact statement (EIS). The EIS would analyze the site-specific and regional cumulative effects of coal leasing and development. Alternatives addressed in the EIS would include different combinations of tracts that meet a regional coal leasing target. The analysis of those groups of tracts would result in different impacts than the assessment made in this document for this specific tract. During the process this preliminary tract could be modified. Ultimately, the Secretary will select specific tracts for lease sale. If the tract is leased, the lessee would be required to submit a plan for mining and reclamation (M&R) to the Secretary of Interior, Office of Surface Mining (OSM) for review and approval within 3 years after leasing. Once a mining plan has been submitted, OSM would review the proposed developments of the mining plan. OSM would prepare a site-specific environmental assessment or EIS prior to approval of the mine plan.

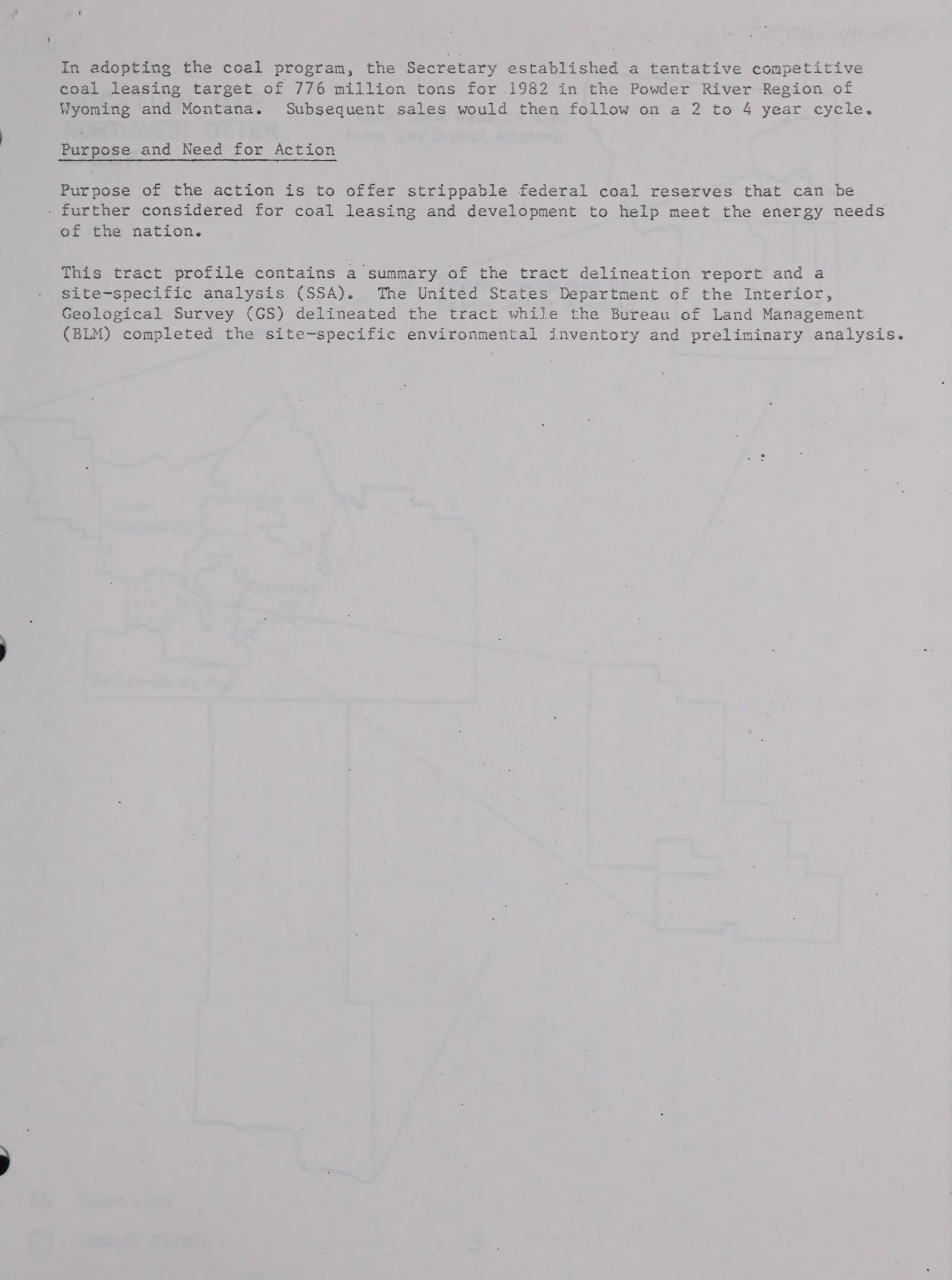
Development of the tract is in accordance with the federal coal management program adopted by the Secretary, Department of the Interior, in June 1979. Basis of the program was, in part, the Final Environmental Statement for the Federal Coal Management Program. Implementation procedures are contained in Title 43 - Code of Federal Regulations - Part 3400 (43 CFR 3400). Authorizing actions are The Mineral Leasing Act of 1920, as amended; The Mineral Leasing Act for Acquired Lands of 1947, as amended; the Federal Land Policy and Management Act of 1976; the Surface Mining Control and Reclamation Act of 1977; the Multiple Mineral Development Act of 1954; the Department of Energy Organization Act of 1977; the National Environmental Policy Act of 1969; the Federal Coal Leasing Amendments Act of 1976, as amended; the Act of October 30, 1978, and Federal Regulations concerning federal coal leasing and development including 43 CFR 3400; 30 CFR 211; and 30 CFR 700-899.

In adopting the coal program, the Secretary established a tentative competitive coal leasing target of 776 million tons for 1982 in the Powder River Region of Wyoming and Montana. Subsequent sales would then follow on a 2 to 4 year cycle.

Purpose and Need for Action

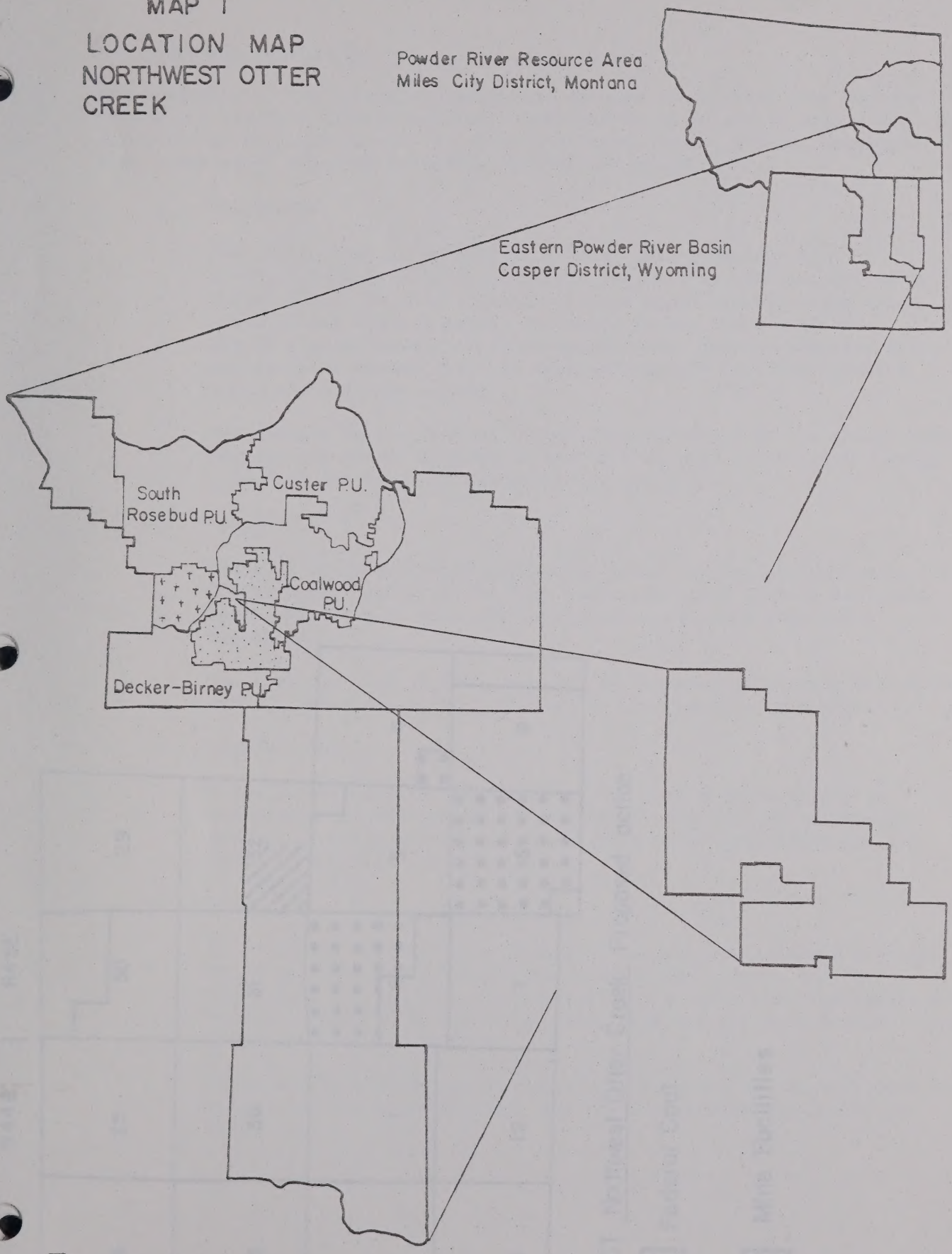
Purpose of the action is to offer strippable federal coal reserves that can be further considered for coal leasing and development to help meet the energy needs of the nation.

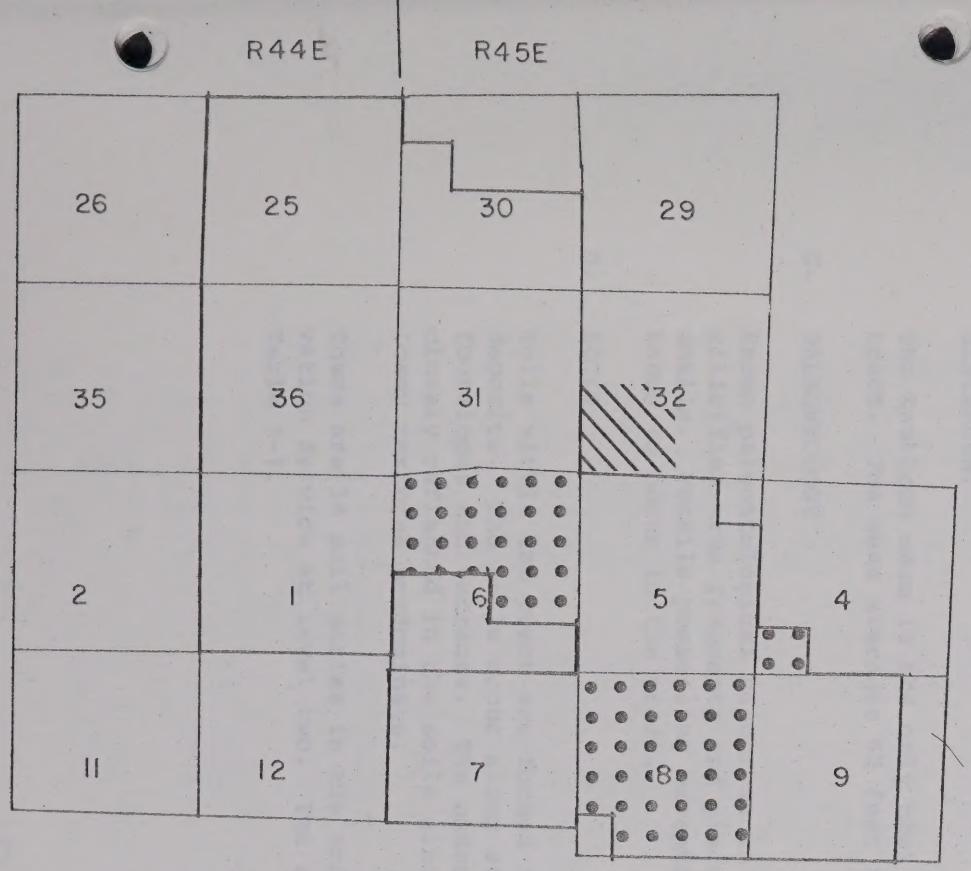
This tract profile contains a summary of the tract delineation report and a site-specific analysis (SSA). The United States Department of the Interior, Geological Survey (GS) delineated the tract while the Bureau of Land Management (BLM) completed the site-specific environmental inventory and preliminary analysis.



MAP I

LOCATION MAP
NORTHWEST OTTER
CREEK





TRACT Northwest Otter Creek Proposed action

Federal Coal

Mine Facilities

II. AFFECTED ENVIRONMENT

The environment that currently exists and changes anticipated from ongoing trends are included in this section. Information is presented within the time frame of the proposed action including the alternatives, and is restricted to that information required to assess significant impacts.

A. TOPOGRAPHY

The mining unit is located on a ridge that separates the northeastward-flowing Tongue River from the northwestward-flowing Otter Creek. The two streams converge approximately three miles north of the subject tract. Drainage within the mining unit boundary is primarily eastward toward Otter Creek. Numerous side gullies have eroded into the soft sedimentary rock and formed a dendritic drainage system.

The terrain varies from relatively flat surfaces to the steep-sided valleys and buttes located in the central part of the unit. Total relief of the tract is approximately 600 feet.

B. GEOLOGY

The area is underlain by sandstone, shale and coal belonging to the Tongue River Member of the Fort Union Formation (Paleocene). The coal seams in this area are relatively continuous over great distances.

The Knobloch seam is the only coal of economic importance within the tract. The seam averages 62 feet in thickness in this area.

C. PALEONTOLOGY

Known paleontological resources in the area consist of poorly silicified tree fragments and pieces of unidentified calcareous shells. Fossils possessing exceptional scientific value are not known to occur in the tract.

D. SOILS

Soils within the tract are formed in sandstone, shale and alluvial deposits. The soils occur along steep-sided ridges, divides, footslopes and terraces. The underlying bedrock characteristics are closely reflected in the soils since they are not well-developed and loamy textures predominate.

There are 38 soil series in the tract, surveyed by the Soil Conservation Service at level two. The soils discussed are listed in Table 1-1.

NORTHWEST OTTER SOIL EROSION
TABLE 1-1

Soil Mapping Unit Name	Depth Shallow 0-20"	Depth Moderately Deep 20-36"	Depth Deep 36+"	Percent Slope	Soil Erosion Potential Wind	Soil Erosion Potential Water	Surface Acres	Percent of Area	Soil Reconst. Potential 2/	Soil Hazard Conditions	3/ Suitability of Soil Material for Plant Growth (Acre Feet) Good	Fair	Poor
Burney-Cooers-Kirby complex			X	2-15	Low	Mod.	110	2.00	Poor	Stoniness	56.	86	402
Burney-Kirby channery loams; Burney-Kirby channery loams, moist			X	4-25	Low	High	46	1.00	Poor	Stoniness	24.	27	178
Burney-Kirby-Cabbart complex; Cabbart-Armells-Rock outcrop complex	X (.40)		X (.60)	25-70	Low	High	219	4.00	Poor	Stoniness, slope	14	184	820
Cabba association; Elso silt loam	X			8-50	Low	Mod.	329	6.00	Poor	Excess lime	—	278	230
Cabbart-Yawdim Rock outcrop complex	X			15-70	Low	High	153	3.00	Poor	Excess lime, slope	8	142	379.
Cushman-Elso silt loams	X (.30)	X (.70)		4-8	Low	Mod.	31	0.50	Poor	Excess lime, too clayey	34.	15	10
Delpoint-Cabbart-Yamac loams	X (.30)	X (.40)	X (.30)	8-25	Mod.	High	423	8.00	Poor	Excess lime	173.	520	1024
Delpoint-Cabbart-Yawdim complex	X (.55)	X (.45)		25-70	Mod.	High	609	11.00	Poor	Excess lime, slope	49	688	1687
Elso silt loam	X			15-45	Low	High	42	1.00	Poor	Excess lime, slope	—	24	45
Fergus-Kelan association			X	2-8	Low	Low	76	1.00	Fair	Excess lime	47.	166	168
Gerdrum-Kobar silty clay loams; Haverson silty clay loam, silt loam, soils, channeled; Yamac loam			X	0-8	Low	Mod.	242	4.30	Fair	Excess lime	113	551	365.
Heidt silty clay loam			X	4-8	Low	Low	31	0.50	Fair	Excess lime, too clayey	—	155	—
Hopley and Kelan loams			X	4-8	Low	Mod.	7	0.10	Poor	Excess lime	11.	10	9
Lonna silt loam			X	8-15	Low	High	7	0.10	Poor	Excess lime	4.	—	31
Lonna-Cabbart-Yawdim complex	X (.45)		X (.55)	2-8	Low	High	45	1.00	Poor	Excess lime	23	33	169

1/ Soil Depth Classification and Soil Erosion Potential is derived from the Powder River County Soil Survey Report and S.C.S. Soil Series Descriptions and Interpretations for Rosebud County

2/ Soil Reconstruction Potential is derived from the National Soils Handbook.

3/ Depth (in acrefeet) of available soil calculated from acres X acrefeet/acre = suitability of soil material for plant growth.

Soil Mapping Unit Name	Depth 1/ Shallow 0-20"	Moderately Deep 20-36"	Deep 36+"	Percent Slope	Soil 1/ Erosion Potential Wind	Water	Surface Acres	Percent of Area	2/ Soil Reconst. Potential	Soil Hazard Conditions	3/ Suitability of Soil Material for Plant Growth (Acre Feet) Good	Fair	Poor
McRae silt loam			X	2-4	Mod.	Mod.	71	1.20	Fair	Excess lime	30	325	—
Midway-Elso association; Midway and Elso rocky soils	X			8-75	Mod.	High	1831	33.00	Poor	Excess lime, slope	—	339	2050
Midway-Thurlow association	X (.55)		X (.45)	8-15	Mod.	Mod.	147	2.60	Poor	Excess lime	—	72	354
Nuhill-Elso association; Ringling-Relan association	X (.40)		X (.60)	6-25	Low	Mod.	504	9.00	Poor	Excess lime	229	508	855
Ringling slaty loam	X			20-50	Low	Low	47	1.00	Poor	Excess lime, slope	—	35	27
Ringling-Cabba association	X			15-50	Low	Mod.	380	7.00	Poor	Excess lime, slope	—	395	110
Shale outcrop	X			—	Mod.*	High	12	0.20	Poor	Slope, erosion	—	—	—
Terrace Escarpments			X	—	Mod.*	High	28	0.50	Poor	Slope, erosion	—	18	76
Thurlow silty clay loam; Hesper silty clay loam			X	4-8	Low	Mod.	19	0.30	Poor	Excess lime, too clayey	—	53	13
Yamac-Busby Complex			X	2-8	Mod.	Mod.	28	0.50	Fair	Excess lime, too sandy	57	18	59
Yamac-Cabbart loams	X (.40)		X (.60)	8-25	Low	High	11	0.20	Fair	Excess lime	5	13	31
Yamac-Rentsac Complex	X (.50)		X (.50)	2-15	Low	Mod.	516	1.00	Poor	Excess lime, Stoniness	33	48	124
Totals							5504	100			910	4702	9216

* Variable in wind erosion potential

Reconstruction Potential:
Fair - 7%
Poor - 93%

Soil Erosion Potential:
Wind
Low - 44%
Moderate - 56%

Water
Low - 3%
Moderate - 34%
High - 63%

Soil Depths:
Shallow - 66%
Moderately Deep - 9%
Deep - 25%

Suitability of Soil Material for Plant Growth
Good - 3%
Fair - 17%
Poor - 34%
Unsuitable - 46%

E. WATER RESOURCES

1. Ground Water

Ground water characteristics in the tract are typical for the Otter Creek coal area, except minimal use occurs. Only two stock wells are in use and two undeveloped springs are in the tract. The Knobloch coal seam is one main source of water. It is saturated in the tract and is prelinimarily estimated to flow at 22,000 cubic feet per day (cu ft/day) (Cannon 1980). Total dissolved solids (TDS) concentration or salinity of wells in the tract is unknown but averages about 2,500 milligrams per liter (mg/L) in the area.

2. Surface Water

Otter Creek is the only major stream in the vicinity of the tract. Stream flow is measured at Ashland, about six miles south (downstream). Mean annual yield is 6.22 acre feet/year or 0.54 cu ft/sec (USGS 1979). Approximately 4,200 acres of the drainage is irrigated, mostly by waterspreading (Knapton and McKinley 1977). Subirrigation is relied upon to supply moisture during the summer. Water quality data is available above and below the site (See Regional paper, unpublished manuscript in Miles City District Office of BLM). Total dissolved solids concentration (TDS) on index to salinity, varies from 228 to 2,690 mg/L and is seldom measured below 2,000 mg/L. Lower concentrations occur during high flows from snowmelt and storms in the winter and early spring. Sediment yield varies from 0-0.2 ac ft/sq mi/yr for bottomlands to 0.8-1.2 for hillslopes (EMRIA 1975).

3. Alluvial Valley Floors and Floodplains

No flood plains or alluvial valley floors (AVF's) were defined to be over public minerals in the tract. However, a floodplain and a potential AVF along Otter Creek, just east of the tract, have been identified. There is much overlapping of the floodplain and AVF. The floodplain is unsuitable for mining and final AVF determination will be made by the Office of Surface Mining at mine plan stage.

F. VEGETATION

The Northwest Otter Creek Economical Mining Unit (EMU) is made up of two major vegetative rangeland types (Payne 1973). These are the undifferentiated stream bottoms and ponderosa pine savannah (See Regional paper). The area included in the two vegetative types consists of : (a) grassland - 640 acres, (b) sagebrush-grassland - 3679 acres, (c) ponderosa pine - 1033 acres, (d) Other - 112 acres.

Within these vegetative types, there are varying range sites with varying production yields (pounds per acre) and condition classifications. There are approximately 1,144 AUMs being produced per year on the tract.

G. LAND RESOURCES

1. Agriculture

Agriculture operations in this area are mainly livestock, hay (alfalfa or grass-legume) and some small grains. The bottomlands are flood-irrigated during spring runoff then sub-irrigated for the balance of the growing season. The water in Otter Creek is too high in salts and alkalinity for irrigation the rest of the growing season. Alfalfa, grass-legume hay or small grains (oats or barley) are crops raised to feed the livestock in the winter months. Approximately 2 percent of the tract, which is Class III land, is currently being used as cropland. In addition, there are approximately 359 acres of Class III and IV privately-owned land (6.6 percent of the tract) that are suitable for cropping, but not presently cropped.

Approximately 310 acres could produce approximately 507 tons of alfalfa and support 155 AUMs or produce 6,688 bushels of winter wheat per year and have 49 acres suitable for tame pasture, which could provide 44 AUMs. Federal land consists of approximately 19 acres of Class IV land that is suitable for tame pasture and would provide approximately 17 AUMs, less than 1 percent of the tract.

The State of Montana owns about 138 acres of Class III and IV land (2.5 percent of the tract) that is suitable for cropland, but is not presently being cropped. This land could produce 129 tons of alfalfa and support 69 AUMs or produce 4,191 bushels of winter wheat.

2. Recreation

The area is relatively isolated from recreational use or demand. There is no recreational development in or near the area. Some very limited hunting use may occur. Since no public access exists, any use of the tract for recreation would require landowner permission. This restriction, along with remoteness from population centers, effectively prohibits use of the area. The area contains no wilderness potential.

3. Other Land Uses

The land within the tract is presently used solely for ranching with some farming of hay and wheat fields in the bottomlands of the creek. There are no industrial activities and the only other use of the tract is for a small portion occupied by the Otter Creek road. Existing roads are gravel and receive low use and maintenance. There is no rail service at present, however, the Tongue River Railroad Company proposes to construct a railroad to run from Birney, to Miles City, Montana, where it would connect with Burlington Northern tracks. The new railroad would also require a 3-mile spur to be built to the Northwest Otter Creek tract. The route is not final and several alternatives have been proposed. If approved, construction would begin in 1982 with completion scheduled in 1984.

H. WILDLIFE AND FISHERIES

The Otter Creek-Northwest tract supports a wide variety of wildlife, with nearby Otter Creek supporting a limited sport fishery for game and non-game fishes. Shrub species important to wildlife such as skunkbrush (Rhus trilobata), currant (Ribes spp.), rose (Rosa spp.) and snowberry (Symphoricarpos spp.) are found scattered throughout the tract.

Two sharptailed grouse arenas occur over private minerals within the tract. One other arena is located immediately adjacent to the tract. No exclusions were made for the sharp-tailed grouse arenas as they are located over private minerals within the lease recommendation area. Attendance at the two grounds in or near the tracts was 5, 16 and 7 males respectively. Overall arena density was 1.22 year-round.

Mule deer use occurs in all of the tract with the highest use found on the dissected midslopes in the sagebrush-grassland vegetational type. During hard, cold winters such as that of 1978-79, the ponderosa pine type received the greatest useage as deer were forced out of the creek bottoms and sagebrush-grassland types. A winter concentration area of up to 20 deer was observed in portions of the Tract. During early spring, the agricultural areas along the creek bottoms receive some use as these areas green up.

Antelope range throughout the Ashland-Otter Creek area with the majority of use found on the dissected midslope areas in the sagebrush-grassland vegetation type. Several distinct areas of winter use by antelope were observed in the Ashland-Otter Creek area, with up to 200 animals being present in the drainage including one tract area that had up to 40 animals present during the open winter of 1979-80. The Otter Creek drainage may be marginal winter range for antelope as herd numbers dropped from over 200 to 77 during January when worst winter weather for 1979-1980 occurred.

The lower Otter Creek drainage has been identified as a spawning stream for several species of fish migrating out of the Tongue River. Of greatest concern are the smallmouth bass and northern pike. Although the EMU does not include the stream, it does have a contributing influence to the water quality and quantity.

The bald eagle has been observed as a migrant in the area. No other threatened or endangered species occur.

State of Montana species of special interest or concern identified in the Otter Creek area are the Swainson's hawk, Cooper's hawk, prairie falcon, upland sandpiper, burrowing owl, long-eared owl, mountain bluebird, clay-colored sparrow, Brewer's sparrow and field sparrow. Snapping turtles are common in Otter Creek and one small prairie dog town exists in section 5, T. 4 S., R. 45 E.

I. CULTURAL RESOURCES

Within the Northwest Otter Creek tract, 1,640 acres have been intensively inventoried in two surveys contracted by BLM (Davis 1976, Bryand, Rollefson and Gehr 1980) (See Map 2). The two surveys recorded 25 prehistoric sites. Ten of the sites were determined eligible for the National Register of Historic Places, after consultation with the Montana State Historic Preservation Officer. BLM is seeking concurrence on the determinations of eligibility from the Keeper of the National Register. An additional 58 isolated artifacts have also been recorded. No historic sites have been recorded in the tract.

Present impacts to cultural resources derive principally from rodent disturbance, grazing activity, frost heaving and erosion. Projected site density for the unsurveyed portions of the tract at 95 percent confidence is 9.6 ± 3.92 sites per square mile. There is a 40 percent probability of locating additional sites eligible for inclusion in the National Register, based on present information.

J. VISUAL RESOURCE MANAGEMENT

The tract is located in an area presently used exclusively for ranching and some farming. The scenic quality is fairly good with low mountains, forested hills and some breaks in or near the area. This area lies in scenic quality classes B and C with C predominant. This area contains scenic quality categorized as predominantly class C because of its largely common physiographic and vegetative characteristics. These are some limited areas of uniqueness in land form, color and vegetation which are categorized as class B.

K. ECONOMICS

Present employment in the affected areas of Colstrip and Forsyth in Rosebud County and Broadus in Powder River County is approximately 1883 energy workers. New workers, including both construction and

Figure 1.2-1

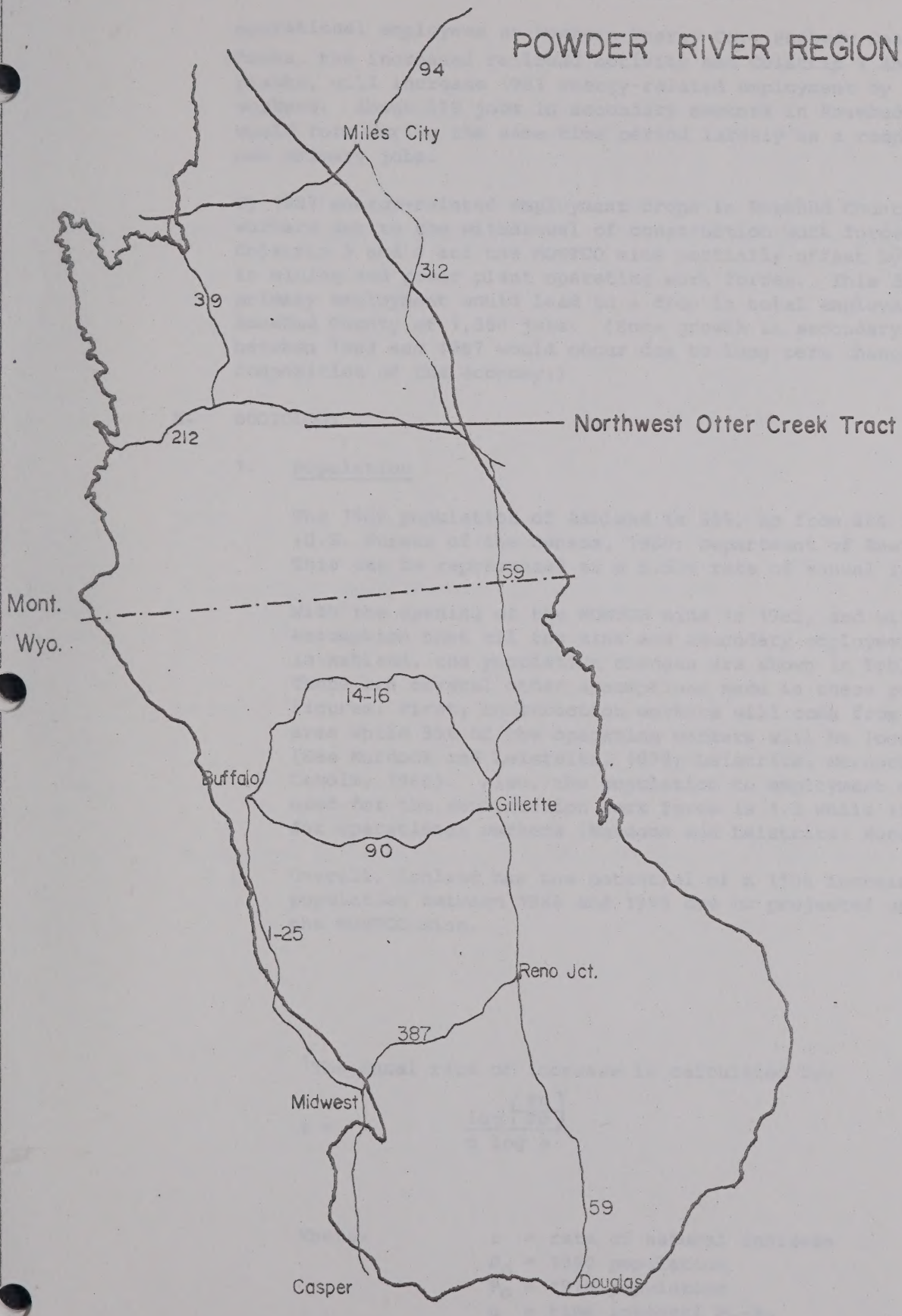
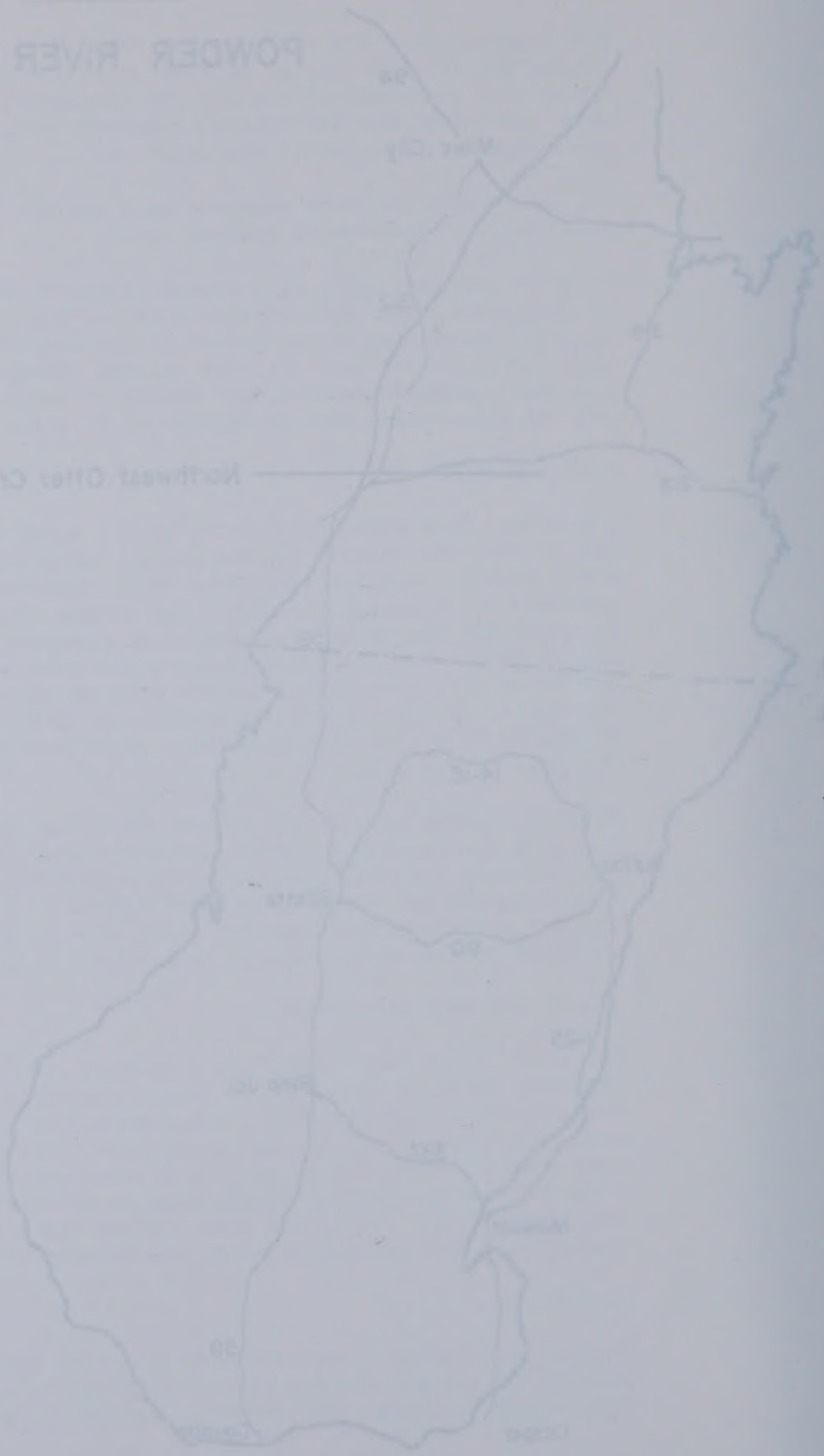


FIGURE 1.2-1



operational employees at Western Energy Co., Peabody Coal and MONTCO mines, the increased railroad activity and Colstrip 3 and 4 power plants, will increase 1983 energy-related employment by 2,152 workers. About 679 jobs in secondary sectors in Rosebud County would form during the same time period largely as a response to the new primary jobs.

By 1987 energy-related employment drops in Rosebud County by 2,027 workers due to the withdrawal of construction work forces from Colstrip 3 and 4 and the MONTCO mine partially offset by small gains in mining and power plant operating work forces. This decrease in primary employment would lead to a drop in total employment in Rosebud County of 1,360 jobs. (Some growth in secondary employment between 1983 and 1987 would occur due to long term changes in the composition of the economy.)

L. SOCIOLOGY

1. Population

The 1980 population of Ashland is 569, up from 400 in 1970 (U.S. Bureau of the Census, 1980; Department of Energy, 1979) This can be represented as a 3.53% rate of annual increase.[1]

With the opening of the MONTCO mine in 1982, and with the assumption that all the mine and secondary employees will stay in Ashland, the population changes are shown in Table 1-2. There are several other assumptions made in these population figures. First, construction workers will come from outside the area while 50% of the operating workers will be local hires (See Murdock and Leistritz, 1979; Leistritz, Murdock, and Leholm, 1980). Also, the population to employment multiplier used for the construction work force is 1.2 while it is 1.65 for operational workers (Murdock and Leistritz; Murdock 1980).

Overall, Ashland has the potential of a 115% increase in population between 1980 and 1990 due to projected growth and the MONTCO mine.

[1]The annual rate of increase is calculated by:

$$r = \frac{\log\left(\frac{Pn}{Po}\right)}{n \log e}$$

Where:

- r = rate of natural increase
- P_n = 1980 population
- P_o = 1970 population
- n = time interval P_n-P_o
- e = base of the natural logarithms

Table 1-2

Population of Ashland From Projected Growth and the MONTCO Mine, 1980-1990

Year	Additional Population from Projected Growth[a]	Additional Population Due to MONTCO Mine	Total Population
1980			569
1981	20		589
1982	21	47	657
1983	21	527	1,205
1984	23	-46	1,182
1985	23	-395	810
1986	24	No Change	834
1987	24	25	883
1988	26	162[b]	1,071
1989	27	99	1,197
1990	27	No Change	1,224

[a] calculated using the geometric growth curve

$$P_n = (1+r)^n$$

Where:
P_n = future population
P_o = base population
r = rate of natural increase
n = time interval, in years

[b] includes 83 secondary jobs with a population to employment multiplier 1.65

CHAPTER III ENVIRONMENTAL CONSEQUENCES

This section describes the significant environmental effects that would occur with implementation of the proposed action including the alternatives. Such items as threatened and endangered plant and animal species, floodplains and wetlands, and wilderness values have been considered and are discussed as appropriate. Also, negative declarations included in the matrices are not presented within the impact descriptions in this section. Principal basis for the analysis is the professional judgments of the resource specialists, public and other agency input, and related works, as referenced.

I. NO ACTION ALTERNATIVE

The no action alternative would result in no disruption of the natural land surface.

Under the no action alternative, about 411 million tons of coal would not be recovered. Three levels of government participate in mining through their taxing power. The federal government's royalty of (at least) 12.5% of the mine-mouth sales price of the coal would, at $10.00 per ton and 3,465,000 tons of federal coal per year yield an annual tax harvest of about $4,331,000, half of which ($2,165,500) would be rebated to the state. The state of Montana severance tax of 30% is applied not to the sales price but to the sales price less some production-based tables - the Contract Sales Price (CSP). The CSP is a function of a complex formula, however, generally the severance tax is about 22% of the mine-mouth sales price. The Northwest Otter EMU, producing 10.3 million tons per year at $10 per ton, would generate about $22,700,000 of annual severance taxes. County and school assessed value equals 45% of the contract sales price or, at $10 per ton mine-mouth sales price, $3.33 per ton. Rosebud County 1977 mill levies, including schools, averaged 69.55 mills. The Northwest Otter EMU, producing 2.6 million tons, would at that rate generate about $602,200 in gross proceeds taxes for the county and schools (23.2¢ per ton - $3.33 x .06955).

Powder River County 1977 mill levies, including schools, averaged 81.73 mills. The Northwest Otter EMU, producing 7.7 million tons per year in Powder River County, would at that rate generate about $2,096,000 in gross proceeds taxes for the county and schools (27.2¢ effective tax rate per ton).

Under the no action alternative, the paleontological resorce would remain undisturbed. However, the potential for exposure and study of unearthed fossils would be lost.

If mining does not occur, none of the impacts related to this tract will be experienced.

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II. PROPOSED ACTION

A. TOPOGRAPHY

The natural variety of landforms now displayed within the area would be greatly reduced by mining. Slopes, out of necessity to abate erosion, would be reduced. Changing or altering the natural erosional patterns will increase the rates of the area's sediment yield until such time that natural vegetation can be reestablished.

B. GEOLOGY

The Montana Department of State Lands requires additional testing to assure that potential toxic horizons are not overlooked.

The major impact of the proposed action would be the removal of about 411 million tons of coal.

C. PALEONTOLOGY

Fossils may be destroyed during the mining process. However, surface disturbance may unearth fossils that could be collected and studies made of specimens that would have otherwise remained buried.

D. SOILS AND RECLAIMABILITY

The proposed action would have a significant impact on the soil in the tract (See Table 1-1). By the end of mine life, 5,464 surface acres would be disturbed, in addition to 225 surface acres used for facilities and haul roads.

Soil impacts include: displacement of soil from wind and water erosion, change in soil structure and natural fertility, and significant problems in revegetation and stabilization on steep slopes.

In the tract, there is a moderate potential displacement of soil by wind erosion of 56 percent and a high potential displacement of soil by water erosion of 63 percent. (See Table 1-1.) Proper seeding of the stockpiles will reduce this.

Disturbances of the soil would result in alterations of soil structure and porosity. This alteration would affect permeability, infiltration rates, soil-air and soil-water relationships and bulk density. The natural fertility would be affected by disruption of the nutrient cycle and a decrease in organic matter content within the soil. Salinity content would increase as a result of the lower calcareous horizons being brought to the surface.

The soil reconstruction potential is derived from the National Soils Handbook (USDA). The soil hazard conditions determine the reconstruction potential. The tract is rated as 7 percent fair and 93 percent poor for reconstruction. Suitability of the soil material for plant growth is rated as 3 percent good, 17 percent fair, 34 percent poor and 46 percent unsuitable. (See Table 1-1.) The soils rated poor can be reclaimed, but would require more intensive and costly management to be revegetated and stabilized.

The steepness of slopes (+25°), excessive overburden (+500 ft.) and stability problems associated with the overburden may present a deterrent to mining in section 1, T.4S., R.44E.

E. WATER RESOURCES

1. Ground Water

The primary effect of mining on ground water is on well water in and near the tract during mining and on long term water quality. Two stock wells would need to be redrilled to about the premine depth. Two known undeveloped springs disturbed during mining should reappear. Water levels in about nine wells in the vicinity of the tract would be very much reduced and possibly could go dry during mining. Flow into the pit during mining would be medium among the tracts, preliminarily estimated at 22,000 cu ft/day with an adequate stream buffer (Cannon 1980).

Following mining, water quality at the depth of the Knobloch coal seam and alluvium in the vicinity of the mine would be degraded by increased salinity. The impact would be long term but the degree is unknown. The water would be useable for stock but would be even more marginal than the poor quality water currently used for household purposes.

2. Surface Water

Stream flow in Otter Creek would be only slightly reduced during mining if an adequate stream buffer is provided (Cannon 1980). Sediment yields can be considered to be proportional to the soil erosion losses discussed in the soils section. For the tract, the primary effect on surface water is related to increases in ground water chemical concentration following mining. However, ground water from the mined area would be diluted by upstream flow when used for waterspreading or fish spawning, so downstream effects would be slight.

3. Alluvial Valley Floors and Floodplains

Plants drawing from subsurface water (subirrigation) in the alluvium would be influenced to a slight degree by increased ground water chemical concentrations following mining. The effect would be greatest in the subirrigated land adjacent to the tract; downstream land would not be affected as much because less concentrated water from outside the tract would dilute the increases in concentrations from mining the tract. Crops that are more sensitive to salts would be affected more than less sensitive ones. For example, alfalfa is more sensitive than barley.

F. VEGETATION

If the range is in excellent condition (100-76%) there would be an approximate loss of 1,816 to 1,249 AUMs. However, in its present condition, there would be a loss of approximately 1,144 AUMs.

Reestablishment of native vegetative communities depends upon climatic conditions, species diversity and reclamation technique.

The reclamation process for the initial cut would probably be delayed for 2-3 years dependent upon the mining operation. When the mining operation gets into a cut-and-fill situation then the reclamation process would start. Provided there is adequate vegetation present on the reclaimed land, grazing would start after the sixth or seventh year on the initial 137-acre cut and approximately in the fifth year after the mining process becomes a cut-and-fill operation. As mining proceeds in different areas of the tract, not all of the land is utilized for mining at any one time and grazing could occur on portions of the tract.

Mining of the area would temporarily eliminate opportunities for domestic livestock to occupy the surface and to utilize the forage. However, vegetative production may be better after mining (due to extensive reclamation work) and the area may produce more than the current number of AUMs per acre. There is, however, no evidence that the plant community that ultimately evolved would support higher levels of livestock grazing than the premining vegetation supported.

Additional impacts resulting from vegetation disturbances would be (a) possible reduction of the visual aesthetics, (b) increased soil erosion, and (c) reduction in the amount of wildlife and livestock forage.

The Office of Surface Mining assures that the mining company establishes a diverse, effective and permanent vegetative cover to standards set by the Montana Department of State Lands and the federal Bureau of Land Management.

G. LAND RESOURCES

1. Agriculture

The proposed action would have a significant impact on agriculture in the tract. (See Table 1-3.) By the end of the mine life, 5,464 acres would be disturbed, in addition to 225 surface acres used for facilities and haul roads.

Impacts on agriculture include displacement of 112 acres (97 acres subirrigated and 15 acres nonirrigated) of class III privately-owned land that would produce, on the average, 280 tons of alfalfa and 112 AUMs or 5,442 bushels of wheat per year.

a. Economic Impacts on Agricultural Sales Activity

Assuming, for analytical purposes, a ranch output figure of $164 (LLS = lost livestock sales) per cow/calf unit and using 10.75 AUMs or 0.7 tons of hay as the forage requirement of, respectively, a fully allocated cow/calf pair[1] or fully allocated cow/heifer with calf in utero[1], we have (assuming a five-year disturbance cycle):

$$LLS = \$164.00 \left(\frac{.167 \text{ minewide AUMs}^2}{10.75} + \frac{.167 \text{ minewide tons of hay}^2}{.7}\right)$$

Based on the formula above, the loss of ranch output (LLS) due to mining of Northwest Otter would be about $10,700 per year (at peak disturbance). The loss of secondary income dependent on ranch output (wages and profits in business/government(s) which supply or depend on agriculture) would be $2,700 per year.

b. Off-Site Impacts

Loss of hay meadows near Ashland due to urbanization would (irrevocably) eliminate about 140 acres of haylands. The output value (LLS) of this land is about $82,000 and the secondary income dependent on this output is about $20,500.

c. Total Impact

Total annual sales losses of $92,700 place this EMU fourth in order of agricultural impacts.

[1]A fully allocated cow/calf pair (ccp) or cow/heifer with calf in utero (ccu) includes the amount of forage needed to sustain the ccp/ccu plus the pro rata share of the forage needs of replacement heifers, herd bulls and horses (if any) and is, therefore, the sum of both direct and indirect forage needs.

[2]Using a 5-year disturbanceperiod over the 30-year mine life, .167 of the forage would be lost at peak disturbance.

TABLE 1-3

NORTHWEST OTTER CREEK COAL TRACT

Land Ownership	Percent of Affected Area (Total Acres 3569)	Acres	Land Capability Class 1/ Non-Irrigated	Land Capability Class 1/ Irrigated	Use of Land 2/	Predicted Average Yields (Acres X Avg. Pred. Yld/Acre) = 2/ Wheat Dry-land (Bu)	Wheat Irrigated (Bu)	Barley Dry-land (Bu)	Barley Irrigated (Bu)	Oats Dry-land (Bu)	Oats Irrigated (Bu)	Alfalfa Dry-land (Ton)	Alfalfa Irrigated (Ton)	Tame Hay Dry-land (Ton)	Tame Hay	Pasture Dry-land (AUM)	Pasture Irrigated (AUM)
Private	1.72	96	III	II	Cropland	2493	5127	4014	6618	3588	7947	100	494	80	—	86	1152
Private	<1	1	III	III	Cropland	23	45	37	60	—	70	1	4	1	—	1	10
Private	<1	15	III	—	Cropland	270	—	375	—	—	—	23	—	18	—	20	—
Total	2	112			Cropland	2786	5172	4426	6678	3588	8017	124	498	99	—	107	1162
Private	<1	2	III	II	Not Presently Cropped	48	104	78	130	104	156	2	10	2	—	2	24
Private	<1	51	III	III	Not Presently Cropped	1053	2469	1683	3294	900	4170	46	230	39	—	46	492
Private	3.14	175	III	—	Not Presently Cropped	3837	—	5256	—	6240	—	217	—	173	—	190	—
Private	2.35	131	IV	—	Not Presently Cropped	1750	—	2495	—	—	—	50	—	—	—	44	—
Total	6.45	359			Not Presently Cropped	6688	2573	10212	3424	7244	9326	315	240	214	—	282	516
Montana	1.67	93	III	—	Not Presently Cropped	2976	—	4185	—	—	—	93	—	93	—	93	—
Montana	<1	45	IV	—	Not Presently Cropped	1215	—	1620	—	—	—	36	—	32	—	36	—
Total	2.48	138			Not Presently Cropped	4191	—	5805	—	—	—	129	—	125	—	129	—
Federal Land	<1	19	IV	—	Not Presently Cropped	—	—	—	—	—	—	—	—	—	—	17	—

1/ Soil Capability Classification is derived from the published Powder River County Soil Survey Report and unpublished Rosebud County Soil Survey Report.

2/ Cropland Land Suitable for Cropland and Average Predicted Crop Yields derived from the published Powder River Soil Survey Report, unpublished Rosebud County Soil Survey Report and data from Agricultural Stabilization and Conservation Service, Powder River & Rosebud Counties.

d. Rancher Perspectives on Economic and Social Impacts

Five of the six agricultural landowners in the Northwest Otter Creek EMU were contacted. The largest landowner holds less than 1% of the land in the EMU, however only 0.16% of the operational unit is in the EMU. The smallest landowner holds 10% of the EMU acreage. None of the landowners felt they would suffer a net economic hardship while three felt that they would benefit economically with mining. While the majority of the operators feel they might benefit economically, two of the landowners feel they would suffer a lowering of their level of quality of life. One of the ranchers is opposed to development of mining. Four ranchers were undecided as to whether or not they were in favor of development of coal mining.

2. Recreation

No significant long-term impacts are expected to occur on the tract. Some secondary impacts would occur. Overall recreational demand on federal and private lands would increase due to population increases and the construction or relocation of roads at the mine site might improve legal and/or physical access to some areas. These increases would probably reduce levels of recreation enjoyment due to increased crowding, litter and pollution at and near developed recreation sites.

3. Other Land Uses

Impacts on land use would be relatively minor but highly concentrated. Industrial activities would be introduced into an area of no previous actvity and with little ability to support mining without construction of major facilities and improvement of existing transportation routes. The existing ranching, farming, and wildlife uses of the tract would be displaced for the life of the mine but would again be possible after reclamation. The mine will distrub 5,569 acres plus additional offsite acreages for roads, railroads, and utilities. Assuming respective rights-of-way widths of 100, 200, and 60 feet, the additional disturbed area would total 325 acres for relocation of a portion of the country road, a three-mile rail spur from the proposed Tongue River Railroad, and a minimum 33-mile powerline route from Colstrip.

Changes in the land from these mine-related uses would be mostly temporary and insignificant after reclamation.

The existing road system would have to be extensively upgraded with roads to and within the site. Problems associated with this include increased trespass, vandalism, litter, and fire hazard potentials. A railroad spur will also be necessary and may eventually encourage additional industrial development of the area. Increased road and rail traffic also increases the potential for more accidents because of greater exposure. The

impacts would cease at the end of mining if unnecessary transportation corridors are abandoned and reclaimed; however, this type of land use commonly remains longer than the activity it serves.

H. WILDLIFE

The two sharp-tailed grouse arenas along with the surrounding nesting habitat will be lost in mining. This loss should not significantly depress the area-wide population unless mining also occurs in the same time frame on adjacent tracts. Reclamation will help to replace lost habitat.

A winter concentration area for up to 20 mule deer will be lost in the west central portion of the tract. The availability of similar habitat on the adjacent Custer National Forest should minimize the impact of displacement.

Habitat lost to mining will displace up to 40 antelope from a winter concentration area in sections 5, 7, 8, and 17, T. 4 S., R. 45 E. All or portions of this area will be disturbed during the life of the mine.

Habitat for non-game birds, mammals, and reptiles will be lost during mining. No estimate of the numbers displaced is known, but it is felt it will be a low impact based on the availability of similar adjacent habitats.

Increased traffic along the Otter Creek Road and the influx of people to the area would increase the number of game and non-game birds and animals killed by vehicular accidents and illegal hunting activity. No estimate of this impact can be made at this time.

I. CULTURAL RESOURCES

All sites within the tract boundaries will be subject to direct impact from construction of facilities, transportation corridors, powerline corridors and mining activities, resulting in damage and destruction of sites and their immediate environmental context. Sites not subject to immediate direct impact will receive indirect impacts from increased erosion, increased access and increased vandalism.

J. VISUAL RESOURCE MANAGEMENT

Mining would completely change the character of the tract. Visual impacts would increase in the form of land disturbances due to the mines, roads, railroads and utilities. Changes to the topography, vegetation and scenic quality would occur. Currently, there are no industrial influences in the area, so the contrast would tend to be extreme. Along with this, some decrease in visibility would occur from dust and vehicle emissions. Overall, adverse impacts would be relatively insignificant both during and after mining because the mine would not be readily visible from any major highway and the

topography would not be significantly altered after reclamaion. There is a small amount of above average, "Class B", scenery which would be affected, but due to the location, these visual impacts would be experienced only by persons visiting the mines. Generally the visual impacts would be about the same as those of other mines in the region. All of the impacts would either cease or be reduced to very low levels when mining ends and reclamation is completed.

K. ECONOMICS

1. Employment Change

The Northwest Otter Creek tract would support a mine employing about 370 operations workers. If the mine were open in 1987, employment would peak at 465 workers (some construction and operations workers would be there simultaneously). This would induce the creation of 140 secondary jobs in Rosebud County between 1987 and 1990. By 1990 mine* employment would fall by 95 workers. The total 1990 (primary and secondary) employment with Northwest Otter Creek would be 510 above what it would have been without the development.

2. Cost of Living Implications* - For Ashland Area Mines Only

Growth in the Ashland area will probably result in significantly higher cost of living with increased housing costs contributing most to overall increased cost of living. While it is not possible to state exactly how many people will be directly affected, a recent study (University of Montana 1979) indicates that about three in every ten eastern Montana households had low or fixed income (less than $10,000 per year-1978 dollars) and 17% of the households are headed by persons of retirement age (65 and over). If housing cost increased by 25%, then units which in 1978 cost from $150 to $199.00 per month, would increase to from $187.00 to $248.00 per month. The University of Montana study found that 49% of those buying their homes in eastern Montana and 79% of those renting paid $199.00 per month or less and that about 23% of all households felt they could not afford to pay more than $199.00 per month for shelter. As increases in housing costs of 25% are likely (see Appendix D of the Regional paper "The Economic Setting of Southeast Montana") it is therefore likely that nearly three of every ten households confronting the higher housing costs will be low or fixed income households, that about one in every six will be a household with a household head of retirement age and that two of every nine households will have difficulty adjusting to the higher housing costs.

3. Fiscal Impacts

Relative to other EMU's the fiscal impacts of developing Northwest Otter Creek would be high. Ashland, unlike Colstrip,

is not being provided community capital additions (schools water, sewer, etc.) by a sponsor.* A prefiled bill, LC 181,+ would, if passed by the Montana Legislature, encourage areas like Ashland & Colstrip to incorporate to receive Coal Board assistance. Ashland, if it incorporates, would be at a relative disadvantage to Colstrip and Spring Creek (new town) as the other communities would already have made much of their capital investment before incorporation.

L. SOCIOLOGY

1. Population

The population affect of a Northwest Otter Creek mine is shown in Table 1-4. All of the assumptions stated in Chapter II apply here. In addition, it is assumed that 40% of the population increase from a Northwest Otter Creek mine would go to Broadus to live because of the population growth in Ashland.

With a Northwest Otter Creek mine, Ashland's population increase would be 147%, including the MONTCO mine, over the decade of the 80's while Broadus would increase by approximately 6%.

Because Broadus is very similar to Ashland in terms of community structure, the impacts to Broadus would be similar to those in Ashland, although to a much lesser extent.

These population figures should be seen as heuristic. They are based on many simplifying assumptions. Not only are the figures based on the assumption that growth rates will remain the same, but that the incoming population will actually settle where it is suggested here.

2. Community Services

The community services in Ashland that will likely be the most severely impacted are medical, housing, and recreation (Williams 1975; Murdock, Leistritz, and Schriner, 1980). Other services and institutions that will be affected are the schools and the criminal justice system.

Literature: Wallwork, Susan Selig, Maxine C. Johnson and Paul E. Polzin. Housing Needs and Preferences: A Survey of Montana Households. University of Montana, Missoula, Montana. 1979.

*Montana Power has contracted for much of the capital additions in Colstrip.

+State Senator Tom Towe, personal communication, December, 1980. The exact wording of the bill is not yet known but areas like Colstrip and Ashland would be encouraged to incorporate.

TABLE 1-4

Population to Ashland and Broadus
From A Northwest Otter Creek Mine,
And Total Population 1980-1990

Year	Additional Population to Ashland From A Northwest Otter Creek Mine[a]	Additional Population to Broadus From A Northwest Otter Creek Mine[a]	Ashland Total Population[b]	Broadus Total Population[c]
1980			569	715
1981			589	707
1982			657	699
1983			1,205	691
1984			1,182	684
1985			810	676
1986	295	196	1,129	865
1987	28	18	1,206	875
1988	-185	-123	1,209	745
1989	46	30	1,381	768
1990			1,408	760

[a]Includes construction, operational and secondary workers

[b]Includes the projected growth and MONTCO mine population from Table 1-2, Chapter II

[c]Based on geometric growth of Broadus using a rate of annual increase of -.0111

3. Attitudes

The impacts of development on social attitudes cannot be assessed until after development has occured. There is no way to estimate what changes, if any, in attitudes would occur.

4. Changes in Ashland Community Structure

Given the increase in population to Ashland, the community can be expected to change along the following dimensions. First, increase in population from mineral development will result in a more heterogeneous community which, in turn, generates varying degrees of community conflicts (Albrecht 1978, Cortese 1980, Murdock and Leistritz 1979). Secondly, community interaction will tend to become more formal due to the increase in the population which results in the community-wide social network ("everyone knows everyone else") becoming fragmented and more aspects of social life are accomplished through newly created formal organizations (or bureaucracies, such as welfare agencies, mental health clinics, employment agencies). Previously established agencies become more routinized and formal in their operation, e.g., police departments, schools (Freudenburg 1978, 1980, Hooper 1980).

In terms of the polity, more decisions that affect the community will be made by extra-local sources.

Finally, it must be noted that many of these changes, such as extra-local control and increasing bureaucratization, are occuring in rural communities like Ashland without development (Vidich and Bensman 1968, Warner 1974, Warren 1978); the impacts of coal development just hasten these changes.

M. AIR QUALITY AND NOISE

The present noises and odors would dramatically change from natural to industrial origins as heavy mining equipment, rail and road traffic, and explosives use are begun or increased from present levels.

III. SHORT-TERM VERSUS LONG-TERM IMPACTS

A. SHORT TERM

Production through life of mine is estimated at 411 million tons of coal. The resource would be exported for use in electric generation. The tract would be temporarily committed to a single use that would in turn impact other potential uses.

Short-term impacts on wildlife from mining of the four Ashland-Otter Creek tracts are summarized. Up to ten sharp-tailed grouse arenas and the surrounding nesting habitat would be lost. Approximately 64 mule deer and 184 antelope would be displaced from wintering areas

during mining. Nesting golden eagles and prairie falcons would be disturbed by mining and an unknown quantity of hunting territories would be disturbed by mining. Habitat for non-game birds, mammals and reptiles would also be lost in the short term. An undetermined number of birds and animals would be killed by vehicular accidents and illegal hunting activity due to the increased human population during the life of the mines. Impact on the Otter Creek fishery would be dependent upon the maintenance of water quality and quantity.

B. LONG TERM

Evidence of mining and reclamation would remain in the form of less contrasting topography and an alteration of soil texture and porosity.

Long-term imapcts on wildlife would be dependent on the success of reclamation. If shrubs and ponderosa pine cover cannot be restored, the vegetative diversity of the area would be decreased. This decrease in the vegetative diversity would also decrease the variety of birds and animals currently found in the tracts.

IV. IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCE

The coal removed by mining and that left by current recoverable techniques would be lost from future use.

V. NET ENERGY ANALYSIS

A net energy analysis was calculated using the guidance contained in BLM Washington Office Information Memo 79-282, August 1979. Approximately 38 British thermal units (BTUs) would be expended to produce a pound of coal. That pound of coal, in turn, would produce about 8,462 BTUs. The ratio of energy produced to that expended is over 225 BTUs/1 BTU.

The net energy relationship (ratio of energy produced to energy consumed) for the Northwest Otter Creek EMU is 332 to 1.[1]

1 Based on the Btu value per pound of coal as given in the tract delineation reports and on an average input energy value of 25.6 Btu's of energy consumed for each pound of coal produced (average of the energy consumption of the Decker mines as described by USGS in a 1977 EIS and the WECO area B expansion as described by the Montana Department of State Lands in a 1978 EIS). Only direct energy consumption was considered (the ratios shown do not contain any estimate of energy used in transporting the coal from the mine to the demand center).

ELEMENT	PRESENT SITUATION	ANTICIPATED EFFECT OF LEASING/DEVELOPMENT	SIGNIFICANCE OF ANTICIPATED IMPACT	DATA RELIABILITY	COMMENTS
Soils	There are 38 soil series in the tract mapped at level two in a survey done by the Soil Conservation Service which are found along steep-sided ridges, divides, foot-slopes and terraces.	There will be displacement of soil by water and wind erosional forces; change in soil structure and natural fertility and severe problems in revegetation and stabilization on steeper slopes.	Significance of the impact will be high. Reconstruction potential is rated as 78% poor and suitability of soil material for reclamability is rated as 37% poor and 39% unsuitable	Data reliability is 30% from the Powder River County Area Soil Survey and 80% from the Rosebud County Soil Series Descriptions and Interpretations, prepared by the Soil Conservation Service Better soils in the bottomlands are more accurately mapped than those on the rangelands and steep-sided slopes.	The overall view of the tract for reconstruction potential is lower than what it actually is because of the low reliability of the Powder River County Area Soil Survey.
Water Resources Ground Water Use in Tract	2 stock wells in use and at least 2 undeveloped springs are in the Tract.	Wells would need to be redrilled and springs should reoccur after mining.	Minimal cost for mining company to redrill well	Good	
Quantity	Knoblock coal is saturated The natural flow is preliminarily estimated at 22,000 cu ft/day and is toward Otter Creek.	Water would flow into the mine pit at the given rate. About 9 wells would be affected outside the Tract.	Significant during mining.	Fair-good	
Quality	Quality for the Tract is unknown but TDS should be about 2,500 mg/L for Knoblock coal water.	Increase in salinity of springs and wells in vicinity of mine at depth of Knoblock Seam and above would occur. Water would still be useable for stock. Would be more marginal than existing water for household use.	Significant and long term.	Fair	

ELEMENT	PRESENT SITUATION	ANTICIPATED EFFECT OF LEASING/DEVELOPMENT	SIGNIFICANCE OF ANTICIPATED IMPACT	DATA RELIABILITY	COMMENTS
Surface Water Quantity	Otter Creek is a small perennial stream with a mean annual flow at Ashland of 6,220 ac ft. 4,200 ac of this drainage is irrigated mostly by water spreading.	Only slight reduction of flow during mining with adequate stream buffer. Possibly very slight effect after mining.	Minor if adequate buffer used.	Fair-good	
Quality	Average TDS is about 2,000 mg/L. High salinity and medium sodium irrigation hazard occurs except during high flows, 0.0-1.2 ac ft/sq mi/yr of sediment yield.	Increases in baseflow TDS after mining. Water would still be useable for stock and high flow water spreaders Sediment yields should be proportional to soil erosion losses.	Very slight but long term.	Fair	Reliability would be better if could better predict ground water concentrations following mining.
Alluvial Valley Floors and Flood Plains	Otter Creek is a possible AVF and floodplain adjacent to the Tract.	Following mining, degradation of ground water quality would occur in adjacent alluvium. Small reduction in more salt sensitive crop productivity.	Slight but long term.	Fair	Same as above.
Agriculture	There are 112 acres of Class III land in the Tract that is presently cropped. This land is found in the bottomlands.	There will be displacement of lands currently being cropped and suitable for cropland.	The alfalfa hay production will be reduced by 280 tons and 112 AUMs per year for a 5 year period.	Data reliability is 30% from the Powder River County Area Soil Survey and 80% from Rosebud County Soil Series Descriptions and Interpretations, prepared by the Soil Conservation Service. Better soils in the bottomlands are more accurately mapped. Soils tend to be better than indicated in the Soil Survey, Powder River County.	

ELEMENT	PRESENT SITUATION	ANTICIPATED EFFECT OF LEASING/DEVELOPMENT	SIGNIFICANCE OF ANTICIPATED IMPACT	DATA RELIABILITY	COMMENTS
Vegetation					
Rangeland types	EMU Acres	Acres being Disturbed			
Ponderosa Pine savannah Undifferentiated Streambottoms	Grassland 640 Sagebrush-grassland 3679 Ponderosa pine 1033 Other land 112 5464	Grassland 640 High Sagebrush grassland 3679 High Ponderosa pine 1033 High Other land 112 Low 5464	High - - - - Long-term elimination of the natural vegetation mosaic and species diversity.	Good	Reclamation of Ponderosa pine not yet proven.
Animal Unit Month (SVIM)	1144 AUMs	High	Loss of 1144 AUMs-High	Good	
Animal Unit Month If Range is in excellent condition 100-76%				Good	100% 76% 1816 AUMs - 1249 AUMs
Threatened, Endangered or noxious species	There are no threatened or endnagered plant species found growing in the EMU. However, there are six noxious species found growing in the Powder River Resource Area, but it has not been determined if these species are found growing in the EMU. The species are: A. Conuolulus arvensis B. Cirsium arvense C. Euphorbia esula D. Centaurea repens E. Cardaria draba F. Centaurea maculosa	Low	Low	Good May 16, 1980 Regional Director Region 6 U.S. FWS Denver, Colorado	

ELEMENT	PRESENT SITUATION		ANTICIPATED EFFECT OF LEASING/DEVELOPMENT		SIGNIFICANCE OF ANTICIPATED IMPACT	DATA RELIABILITY	COMMENTS
Reclamation-Vegetation	On Federal, State and Private lands, the Office of Surface Mining (OSM) assures that the mining company establishes a diverse effective and permanent vegetative cover to standards set by the Department of State lands of Montana and the Federal Bureau of Land Management.		Low		High - failure of Reclamation Low - success of Reclamation	Good	
Wildlife Habitat	Acres	% of Total	Acres Disturbed	Year 2026			
Grassland	640	12	640	Low negative	Low negative	Good	
Sagebrush-grassland	3719	67	3719	Moderate negative	Low negative	Good	
Ponderosa pine	1033	19	1033	High negative	High negative	Good	
Agricultural lands	112	2	112	Low negative	No change	Good	
Populations	Level of Use						
Sharp-tailed grouse	High		Low negative		Low negative	Good	Reclamation will minimize impacts.
Golden Eagle	Average		Low negative		Low negative	Good	
Prairie Falcon	Low		Low negative		Low negative	Good	
Other Raptors	Average		Moderate negative		Local-Moderate negative	Good	
Deer	High		Low negative		Local-Low negative	Good	
Antelope	Average		Low negative		Local-Low negative	Good	
Non-game birds & mammals	Average		Low negative		Low negative	Good	
State species of special interest or concern	Low		Low negative		Low negative	Good	
Reptiles & Amphib.	Average		Low negative		Low negative	Good	
Threatend or Endang	None occur		-----		-----	-----	
Fisheries-Otter Cr. Spawning	High		Not assessable		Moderate negative	Good	Impacts dependent on water quality and quantity maintenance.
Stream Fishery	Average		Not assessable		Low negative	Good	

NORTHWEST OTTER CREEK

ELEMENT	PRESENT SITUATION	ANTICIPATED EFFECT OF LEASING/DEVELOPMENT	SIGNIFICANCE OF ANTICIPATED IMPACT	DATA RELIABILITY	COMMENTS
Cultural/Historical Values	29% intensive Class III inventory complete for the tract. 25 prehistoric sites, 58 isolated artifacts recorded. Ten sites determined eligible for the National Register of Historic Places. Projected site density is 9.7 ± 3.92 sites per square mile for the tract. 40% probability of recording additional National Register eligible sites.	All sites within tract boundaries are subject to direct impact i.e., damage and destruction of sites and their immediate environmental context.	Excellent		
Recreation	No development or known use of the area. Very limited use may occur. Hunting by permission of landowner. No public access exists.	None. No recreation functions are planned for the area and legal access does not exist.	Virtually none on the short term. No effect on a long-term basis.	Poor	Recreation data is virtually non-existent.
Wilderness	No wilderness potential within or near area.	None	None	Excellent	Wilderness inventory complete and area eliminated from consideration
VRM	Open air, agricultural environment. Area visible from Otter Creek road. Low mountains, forested hills, some breaks. Scenic quality class B and C, with C predominant.	Disturbance of landforms and natural scene. Some activities visible from Otter Creek road.	Moderate during mine life. Low after reclamation.	High	Very difficult to mitigate impacts while mining is occurring.

ELEMENT	PRESENT SITUATION	ANTICIPATED EFFECT OF LEASING/DEVELOPMENT	SIGNIFICANCE OF ANTICIPATED IMPACT	DATA RELIABILITY	COMMENTS
Noise Air Quality	Natural sounds are prevalent. Some noise from vehicles and farm machinery.	Severe intrusions of heavy equipment. Construction and use of rail system. Use of explosives. Increased traffic on Otter Creek road.	Quite severe during mining. Impact would cease when mine is closed.	Excellent	Impossible to mitigate during mine life.
Transportation Employee:	Existing access by gravel or dirt roads. Low use and maintenance.	Increased traffic on U.S.212, Otter Creek and Tongue River roads. Potential for more accidents. Improvements to roads.	Moderate on all accounts during mining. Very low after mines close.	Good	Road improvements should contribute to safety after mining traffic ceases.
Product:	Roads inadequate for transport. No rail system near area.	Improvements to roads Construction of roads Construction of railroad Rail traffic introduced to area Increased hazards Increased surface disturbance	Moderate Moderate Possibly high Possibly high Moderate Low	Good for all items	
Land Use	No industrial activity. Some farming. Ranching is primary use.	Introduction of industrial activities. Land required for mines, roads, railroads, powerlines.	Moderate during mining. Low to none after reclamation.	Good	Existence of power and rail lines may encourage further development of area.

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